bearing 206°, range 20 mi., and moved to 215°, range 18 mi. by 1850 EST, dissipating soon thereafter. During the period observed, the hole held to the center of the echo, and on the RHI scope presented an appearance similar to a sharpened pencil pointed upward.

5. CONCLUDING REMARKS

Radar operators observe holes in echoes, as discussed here, with some frequency without known funnel activity, possibly more frequently along the Gulf Coast. It has been noted in radar reports that Brownsville and other WSR–57 stations have reported these holes in connection with known or suspected funnel activity.

Some of these holes result from random arrangements of several cells—especially cells beyond about 60–80 mi. for the WSR–57. Others may coincide with unobserved or unreported funnels. The correlation then, between holes of the type reported here and funnel activity, may be vague. However, it seems that the feature deserves serious attention since, when funnel activity is occurring, it should be detectable more often than the waterspout or tornado projections. Also, hard protuberances, more generally accepted as indicators of funnels, occur with even greater frequency, apparently in some instances to the extent of appearing as the classical hook [7], without funnel activity.

Several months' experience with the WSR–57 radar at Daytona Beach indicates that within our range of surveillance funnel activity is at present quite difficult to "see" due to the large masses of echo on the scopes, caused by both the greater areal cloud coverage prevalent in this region, and the greater detection capability of the WSR–57 radar.

In terms of the scope displays, if some attendant features, i.e., reflectivity structure, or critical parameter values associated with echo holes, can be found, it may be that the real cyclone vortices, can be distinguished on the radar in a practical way, from holes appearing randomly. This would be of great importance.

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Weather Note

EXTENSIVE AREA OF PERSISTENT STRATUS AND FOG IN GREAT PLAINS November 27–December 2, 1961

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An area of stratus and fog which extended roughly from western Texas to eastern Nebraska and western Iowa persisted from November 27 to December 2, 1961, a period of almost a week. The areas shown in figure 1 enclose regions where ceilings were below 1000 ft. and/or visibilities below 3 mi. on the dates given. Clouds and fog formed and persisted in a modified polar continental air mass which became cut off and stagnated.

The air mass moved south behind a cold front which entered the Northern Plains on November 26 and spread to the Gulf Coast on the 27th. Stratus and fog formed in the cold air over a large area of the Northern and Central Plains and the upper Mississippi Valley. During the night of the 27/28th the area shrank to that shown by the solid line in figure 1.

A surface ridge formed from southwest to northeast over the area and moved slowly southeastward. A broad ridge aloft moved slowly eastward during the same time (fig. 2). The low-level flow pattern was such that it left a large mass of air relatively undisturbed in and along

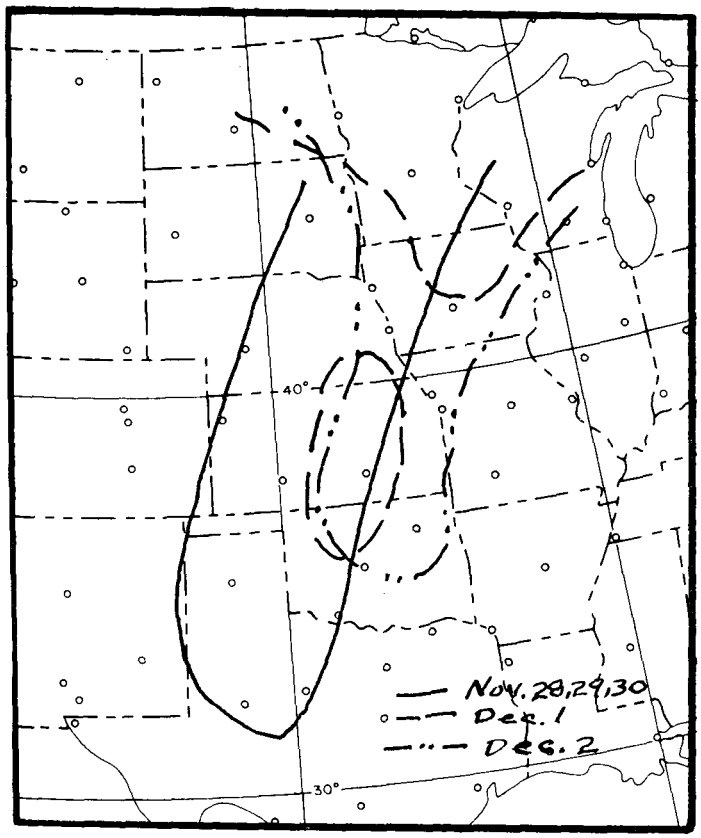

FIGURE 1.—Areas of stratus and fog with ceiling below 1000 ft. and/or visibilities below 3 mi. Solid line encloses approximate area persisting November 28, 29, and 30, 1961. Dashed line encloses area persisting on December 1, 1961. Dash-dot line encloses area persisting on December 2, 1961.

the west side of the surface ridge. The stratus and fog formed and persisted in this stagnating air mass. Even when winds increased on the west side of the ridge the stratus did not dissipate completely. A factor here may have been the saturated condition of the ground, which allowed constant replenishing of moisture by evaporation.

In general, the area shrank and lifted during the day and expanded and lowered at night. The western edge was more variable than the eastern edge. On December 1, the area shrank to that shown by the dashed line in figure 1, after the passage of a wave and weak cold front (fig. 3). The air mass was subsequently reinforced (fig. 4), and the area expanded again on December 2, as shown by the dash-dot line in figure 1. At this time a vigorous system passed to the north, causing a change in air mass, and by noon on December 3 the stratus had dissipated except in the upper Mississippi Valley.

The air mass, of course, was stratified, with a layer of warm, dry air capping a surface layer of cool, moist air. Figure 5 shows a typical sounding. This inversion apparently was so strong that afternoon surface winds of 25 to 30 m.p.h. did not destroy it, for the stratus persisted and sometimes lowered at these times.

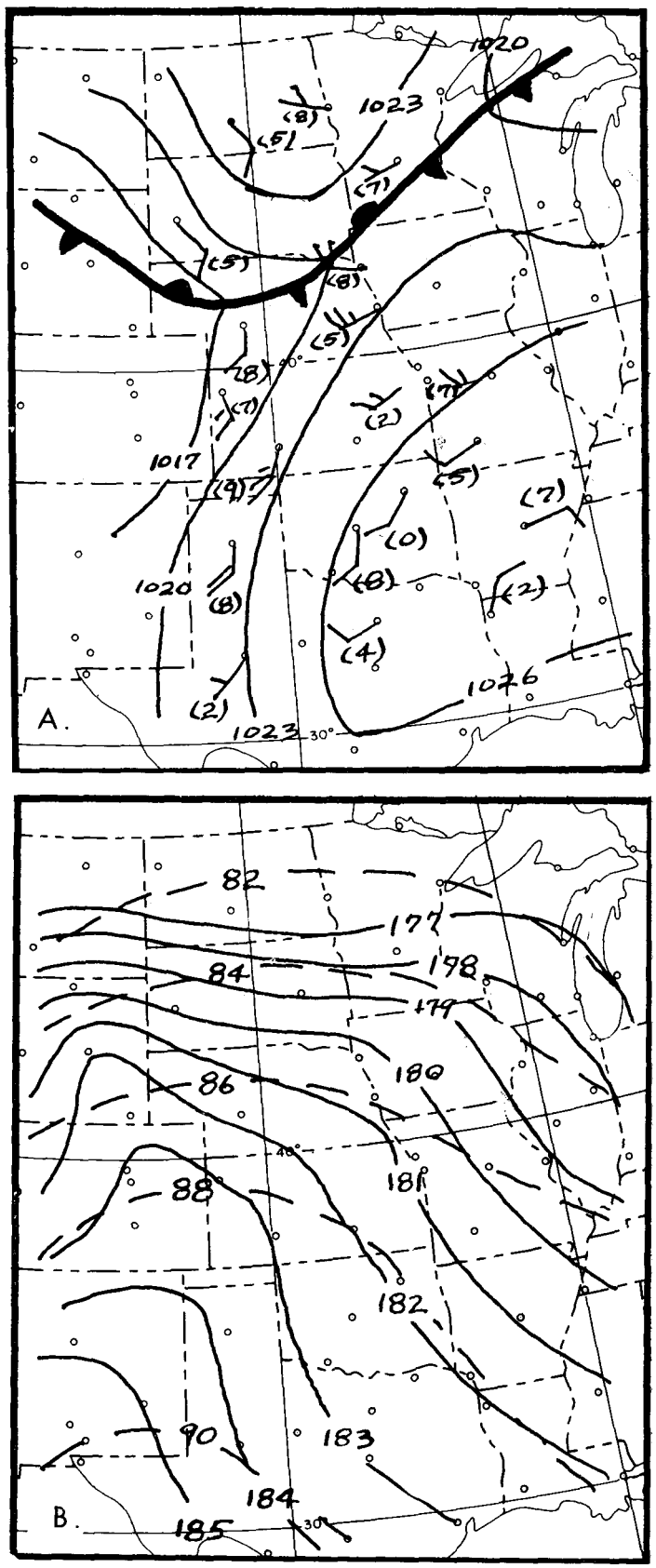

FIGURE 2.—Surface and upper air patterns typical of the period November 28–30. Maps for 0000 GMT, November 30, 1961. (a) Surface map with 4000-ft. MSL winds. Numbers in parentheses indicate wind direction. (b) 500-mb. map and thickness. Dashed lines are 500-mb. contours and solid lines are 1000–500-mb. thickness. Note the thickness ridge over the stratus area.

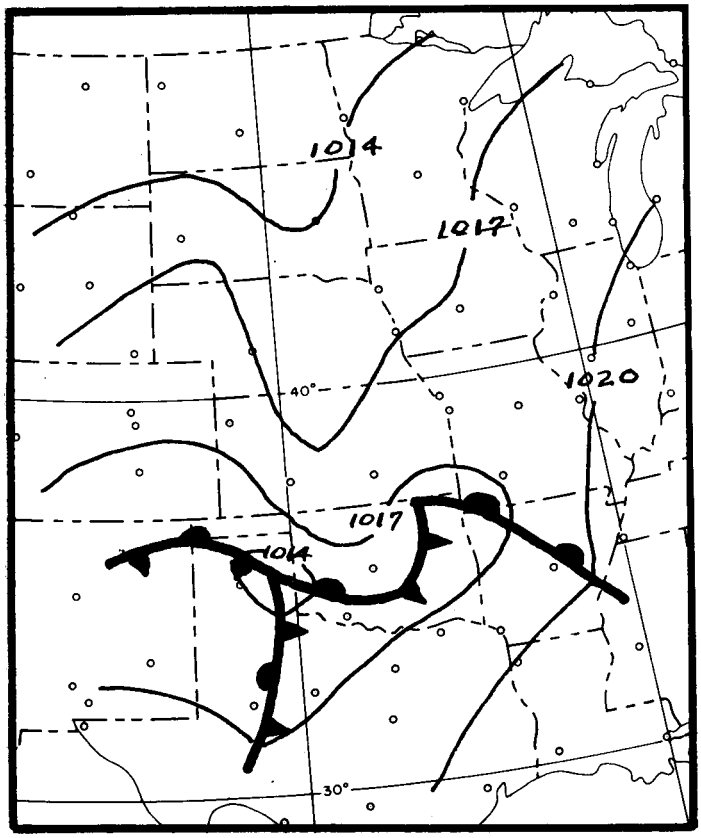

FIGURE 3.—Surface map typical of December 1, 1961. Map is for 0000 GMT, December 2, 1961.

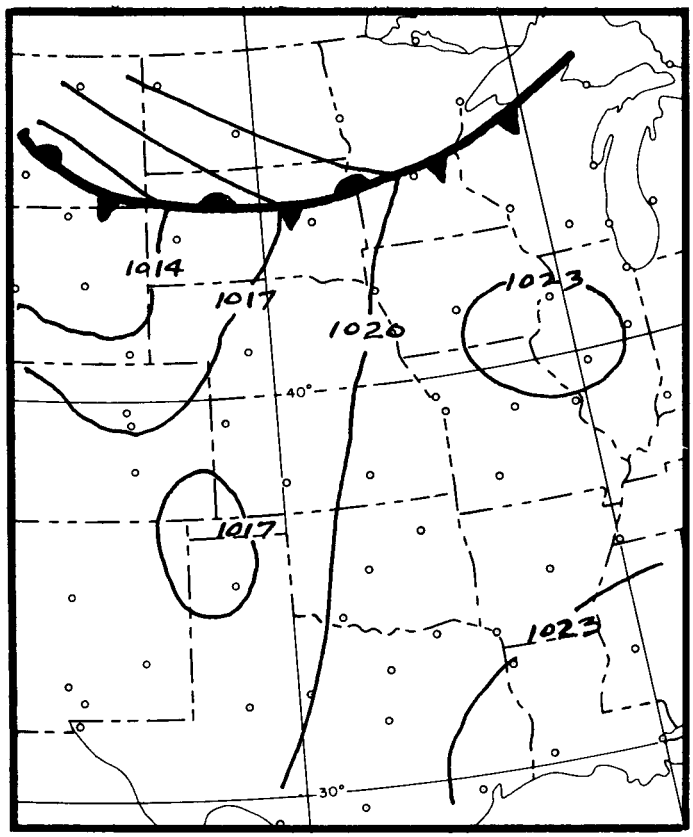

FIGURE 4.—Surface map typical of December 2, 1961. Map is for 1800 GMT, December 2, 1961.

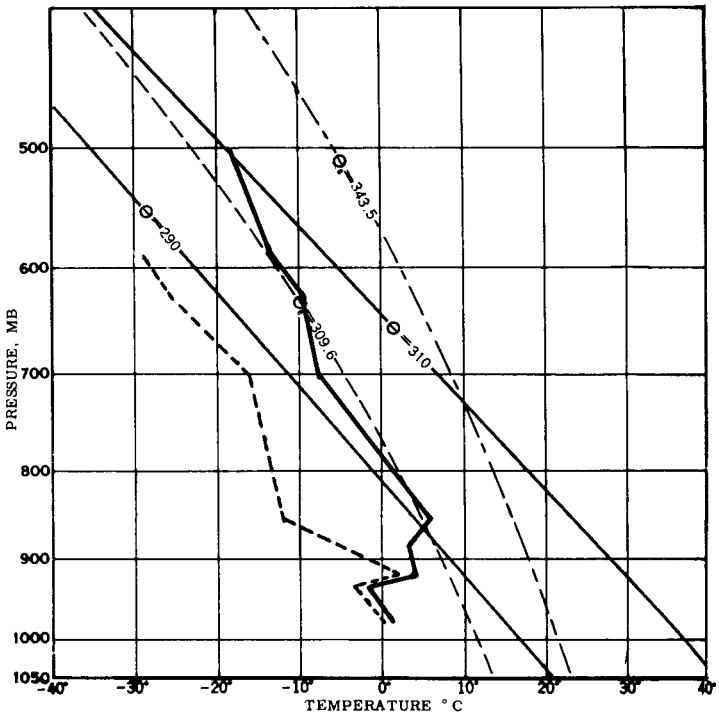

FIGURE 5.—Sounding typical of the air mass. This sounding is for Omaha, Nebr. at 1200 GMT, November 29, 1961. Heavy solid line is temperature curve; heavy dashed line, dew point curve.

The reason for the persistence of this area of stratus is not readily apparent. A number of factors appear to be involved. The moisture and heat budgets and their relation to the low-level circulation and divergence patterns must be the subject of further study.